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The Political Economy of Urban Climate Adaptation and Development Planning in Surat, India

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Abstract. This paper argues for a political economic approach to understanding climate change adaptation and development planning in an urban context. Based on field research conducted in Surat, India, across a period of two years, I illustrate how climate adaptation is rooted in preexisting and contextually specific urban political relationships that can be traced through the city's developmental history. Through assessing Surat's experience with recent industrialization, episodes of natural disasters, to more recent engagement with the Asian Cities Climate Change Resilience Network (ACCCRN), I highlight how adaptation planning, as well as how adaptation is integrated into urban development planning, occurs through processes of prioritizing adaptation against development needs and implementing options that are co-created amongst concerned public and civic actors. This case empirically shows how adaptation is mainstreamed into urban development planning, illustrates the tradeoffs associated with how different urban actors plan and implement adaptation in the context of rapid industrialization and urban growth, and assesses how internationally funded adaptation programs are operationalized in the context of local social and political realities.

Key words: climate change adaptation, development, urban planning, governance, India

1 Introduction

Climate change adaptation is of particular importance to communities in developing countries because of their disproportionate exposure to impacts and lower capacity to respond (IPCC, 2012). Preexisting socioeconomic vulnerabilities and inequities can also be compounded against these new climate stressors (Adger, 2006; Smit and Wandel, 2006). At the same, because of the locally-specific nature of risks and vulnerabilities, cities will be at the forefront of responding to climate impacts and devising climate adaptation strategies (Carmin et al., 2012; Hunt and Watkiss, 2010).

There is growing scholarship on climate adaptation needs and options (Burton, 2005; Füssel, 2009; McGray et al., 2007), incentives and pathways for operationalizing urban adaptation strategies (Carmin et al., 2012, 2013), and prescriptions for potential financing, technical assistance, and capacity building solutions at the urban level (Ayers, 2009; Klein, 2010; Smith et al., 2011; Wiebusch, 2012). At the same time, international development and climate negotiations communities have strongly advocated for policies that seek to integrate and support both climate adaptation and socioeconomic development, arguing that combining these two ideas will help ensure long-term resilience of cities and regions (Huq and Reid, 2004; Kok et al., 2008; Smith et al., 2011; World Bank, 2010). While the literature on the nexus of climate change adaptation and development often makes a normative argument for integrating these two objectives (Huq and Reid, 2004; Lemos et al., 2007), these studies often sideline the local political and socioeconomic differences that exist between cities. Therefore, they fail to unpack the nuances surrounding why institutional and organizational structures of adaptation planning and policymaking exist in the form they do, what sorts of political power and influence shape the different pathways of adaptation planning and implementation, and how the implementation of adaptation strategies can be affected by interacting dynamics between local histories, bureaucratic cultures, and social contexts.

In this paper, I present the case of the city of Surat in India to explore how a particular developing country local government has pursued climate change adaptation priorities in the context of its urban development needs. Despite the presence of a strong international backer, I argue that adaptation planning in Surat builds upon existing institutional alliances between political and entrepreneurial classes who value local innovation, experimentalism, and social capital. At the same time, this approach builds on existing pathways of institutional change that are driven strongly by a sense of capital asset protection, economic productivity, and resilience to natural hazards. In the end, the city's adaptation planning processes is

characterized by the ability to harness local expertise, to co-create implementable options among embedded government and civil society actors, and to build new public-private institutions to consolidate, legitimize, and mobilize support in this nascent policy domain. Although this approach is not without its faults, the initial framing and implementation of these adaptation and development projects and programs then build towards a vision of affecting transformative change in the city.

2 Urban Climate Adaptation and Development

Climate change adaptation refers to adjustments in ecological or socioeconomic systems in response to actual or expected climatic stimuli and their effects or impacts (IPCC, 2012). Often, climate impacts are often compounded due to the need to balance vulnerability reduction with poverty alleviation and development agendas (Dodman and Satterthwaite, 2008; Jerneck and Olsson, 2008). For the purposes of this paper, urban development planning is defined as local programs and strategies for supporting peoples' livelihoods (such as poverty alleviation), improving infrastructure and services (such as water accessibility, public health, and disaster-resilient structures), and promoting economic growth and industrial development. Although this is not an exhaustive assessment of the field as a whole, this definition will serve to set the parameters for evaluating the most critical urban development needs in the context of climate change.

Municipal governments often bear disproportionate responsibility for adaptation (Carmin et al., 2012; Hunt and Watkiss, 2010). Cities, which are often centers of socioeconomic activity, have high population concentrations and are growing faster than their physical infrastructure capacity (Hallegatte et al., 2010; Hunt and Watkiss, 2010). Many municipal authorities hold primary responsibility over a wide array of infrastructure and service provisions that are essential for good living standards, livelihoods, and the reduction

of vulnerability to climate hazards (Osberghaus et al., 2010; Simon and Leck, 2010). Since the failure to address these issues will likely result in increased resource scarcities, escalating social injustices, and contribute to civil instability and violence, adapting cities to the impacts of climate change is critical to human wellbeing and sustainable urban development (Barnett and Adger, 2007; Boyd et al., 2009).

Despite these responsibilities, climate adaptation priorities have yet to be fully incorporated into wider urban planning and development agendas in most countries (Carmin et al., 2012). Cities experience highly variable degrees of autonomy from national governments (Amundsen et al., 2010; Corfee-Morlot et al., 2010), institutional fragmentation, scarce finances, and local conflict between environmental and development goals (Ayers, 2009; Roberts and O'Donoghue, 2013). For many cities, adaptation planning encapsulates "traditional" development goals, such as modernization and industrialization (Jerneck and Olsson, 2008), as well as emerging climate-related development goals, such as reducing climate risks while securing people's wellbeing, enhancing adaptive capacity of the poor, and confronting policies that generate more vulnerability (Dodman and Satterthwaite, 2008; Eriksen and O'Brien, 2007; Puppim de Oliveira, 2013).

The urban poor often experience high exposure to climate hazards, fewer provisions for disaster assistance, less legal and financial assistance, and a general underdevelopment of adequate public services and infrastructure (Hulme, 2003; Huq et al., 2007). Given these many vulnerabilities, the idea of mainstreaming proposes that adaptation and development planning goals are, in fact, complementary (Agrawala and van Aalst, 2008; Ayers and Dodman, 2010). Important reasons for integrating adaptation into development include the ability to streamline decision-making processes (Smit and Wandel, 2006), to accommodate the newly recognized climate agenda without "reinventing the wheel" (Mercer, 2010), and to reduce future remedial costs (Agrawala and van Aalst, 2008). Mainstreaming adaptation into

development at the urban scale is both a planning and governance challenge (Bulkeley, 2009). The ultimate outcome of mainstreaming is a local development plan that anticipates future climate crises while also tackling the underlying structural factors that make cities vulnerable.

There is an emerging literature documenting the activities of local governments who have pursued adaptation at an early stage (dubbed "early adaptor" cities). These cities seem to be motivated by internal incentives, knowledge and support generated through local networks, and an ability to link adaptation to ongoing urban programs (Carmin et al., 2012; Roberts and O'Donoghue, 2013). Institutionally, local governments tend to formalize adaptation planning within their jurisdiction, which helps to legitimize and facilitate implementation and coordination of adaptation programs and projects across sectors and departments (Carmin et al., 2012, 2013). Examples of this include the establishment of dedicated urban climate units and the passing of regulations, policies, codes, and support programs (Anguelovski and Carmin, 2011). These institutions provide formal guidelines and norms that enhance predictability, establish order, and promote coordination (Anguelovski and Carmin, 2011). Conversely, there are bottom-up practices, such as community-based adaptation, that involve participatory approaches (Ayers and Forsyth, 2009; Dodman and Mitlin, 2011). These approaches are a means for promoting engagement in assessments, fostering community self-reliance, reducing social inequalities, and raising awareness of climate vulnerability (Bulkeley et al., 2013; Ebi, 2009; Forsyth, 2013; Magee, 2013).

Despite recent advances in understanding adaptation at the urban level, many scholars have identified a number of barriers to effective implementation. These include difficulties in understanding emerging scientific information about climate hazards and their impact on cities (Carmin et al., 2013; Nay et al., 2014), understanding how broader socioeconomic processes influence urban vulnerabilities (Hallegatte et al., 2010; Romero Lankao and Qin, 2011; Viguié and Hallegatte, 2012), integrating information about climate risk and

vulnerability into local planning processes and development agendas (Puppim de Oliveira, 2009), and the lack of suitable governance frameworks for climate risk management (Amundsen et al., 2010; Bulkeley, 2010; Moser, 2009; Termeer et al., 2013).

3 The Indian Context

Since reforms were implemented starting in 1991, India's economy has experienced a shift towards private and state-supported private enterprises, leading to periods of high economic growth (Kohli, 2004; Koubi et al., 2012). Despite this, India has a substantial population living in poverty. These communities often experience fluctuating economic opportunities, unreliable access to infrastructure and services, and rising tensions between class, ethnic and caste identities, and religious sects (Jaffrelot, 2007; Kohli, 2006). These social tensions may intensify the nature and extent of climate stressors (Mukhopadhyay and Revi, 2012).

Key climate priorities in India include rising surface temperatures, increasingly erratic rainfall leading to changes in monsoon, retreating glaciers, and rising sea levels (Hiremath and Shiyani, 2012; Menon et al., 2013; Mukhopadhyay and Revi, 2012; Revi, 2008). Recent projections point to increasing frequency and intensity of current hazards, a greater probability of extreme weather events, and the emergence of new climate hazards, such as sea level rise (Garg et al., 2007; Mathison et al., 2013; Rupa Kumar et al., 2006; Srinivasan, 2012). These new climate-induced vulnerabilities will further decrease the resilience of poor, such as through loss of livelihoods, loss of community safety nets, and reduced coping capacity to impacts, with asymmetric impacts based on gender, age, and class (Ahmed and Fajber, 2009; Kruks-Wisner, 2011; Mukhopadhyay and Revi, 2012).

In 2008, in light of increasing political attention on climate change (Fisher, 2012; Thaker and Leiserowitz, 2014), the Government of India released the *National Action Plan*

on Climate Change (NAPCC).[1] Through the eight associated national missions, the NAPCC outlined goals and strategies for mitigating climate change and for tackling climate vulnerabilities at the national level (Government of India, 2008). Implementing the NAPCC and its associating national missions are priority issues under the *12th Five-Year Plan (2012-2017)* (Government of India, 2013). Still, since India operates within a highly decentralized federal system, most political authority around climate change rests at the state level. Several research and development institutions have assisted state governments in drafting *State Action Plans on Climate Change* (SAPCC). For example, the United Nations Development Programme (UNDP) assisted in drafting Madhya Pradesh's SAPCC and The Energy and Resources Institute (TERI) was key in Assam's SAPCC process. Lastly, some state governments have been more proactive in climate planning and policymaking. For example, Gujarat become the first state to set up a standalone Climate Change Department in Feburary 2009.

Lastly, despite being physically closest to climate impacts, local governments in India are often operationally hamstrung by a lack of authority and resources. Although the *74th Amendment Act* (1992) to the *Indian Constitution* gave administrative powers over landuse and development planning to urban local bodies (Roy, 2011), authorities over finances, for example, were not devolved. Even with these governance challenges, many city officials and policymakers are beginning to tackle climate vulnerability and are actively devising innovative planning mechanisms to facilitate both adaptation and development (Boyd and Ghosh, 2013; Carmin et al., 2013). Many international organizations are also spearheading support for these urban programs and projects (Sharma and Tomar, 2010). For example, the

[1] The Prime Minister of India approved the *National Action Plan on Climate Change* (NAPCC) on June 30, 2008. The NAPCC is the core of India's domestic climate change policy and includes eight National Missions: *National Solar Mission*, *National Mission for Enhanced Energy Efficiency*, *National Mission on Sustainable Habitat*, *National Water Mission*, *National Mission for Sustaining the Himalayan Ecosystem*, *National Mission for a Green India*, *National Mission for Sustainable Agriculture*, and *National Mission on Strategic Knowledge for Climate Change*.

Rockefeller Foundation's Asian Cities Climate Change Resilience Network (ACCCRN) program is a 9-year, US$59 million initiative designed to build climate resilience in small- and medium-sized cities in Asia. Between 2008 and 2012, the ACCCRN program worked intensively with 10 cities across India, Indonesia, Thailand, and Vietnam to develop city climate resilience strategies (Kernaghan and da Silva, 2014; Reed et al., 2013). Since 2012, the Rockefeller Foundation has partnered with other international institutions, such as ICLEI-Local Governments for Sustainability, to replicate this approach in additional cities across Asia. Even though externally funded programs such as ACCCRN often operate under their own institutional operational biases, these programs are still aimed at increasing resilience and adaptive capacity of local governments, protecting and strengthening urban infrastructure and public services against future climate impacts, and ensuring adequate representation of the poor in decision-making processes.

4 Methods

The assessment of Surat's experiences with recent industrialization, episodes of natural disasters, to more recent engagement with climate adaptation efforts is centered on this research question: how are emerging climate adaptation priorities being operationalized in light of existing local social and political contexts and urban development pressures?

This analysis is a culmination of fieldwork conducted from January 2011 to June 2013 and draws on historical document analysis, observing city government meetings, and forty semi-structured interviews of key stakeholders and informants involved in Surat's adaptation planning process, including those working in the Surat Municipal Corporation (SMC), Surat Urban Development Authority (SUDA), the South Gujarat Chamber of Commerce and Industry (SCGGI), and the consultancy TARU-Leading Edge. This methodology focused on gathering information on the adaptation and development planning nexus in the city, locating

particular incidences of plan alignment or contestation, and identifying specific examples of how municipal institutions navigated this emerging policy domain. The interviews were subsequently transcribed and coded for details on planning history and process, categories of adaptation and development plans, strategies, and options, and larger themes around public participation and institutional change.

5 Political Economy of Urban Climate Adaptation in Surat

Surat is the second largest city in the State of Gujarat in Western India and has an urban population of more than 4.5 million. Key development challenges for Surat include high rates of population growth, a highly stressed urban infrastructure, and high rates of migration (ACCCRN, 2011). From the 1960s onwards, Surat has experienced 80% population growth per decade, which is attributed to the influx of migrant labor in search of jobs in Surat's well-developed textile and diamond industries (Engelshoven, 1999; Kantor et al., 2006; Shah, 1994). Despite the large amount of wealth housed in and around the city, 55% of Surat's population live in the city's approximately 400 slums, which are located mainly along riverbanks and tidal creeks (Bhat et al., 2013). These slums face high risks of flood and exposure to vector-borne diseases (Lobo and Prasad, 1998; Shah, 1997). Recently, however, due to Surat's zero-slum initiative, the number of people living in slums and slum-like conditions has decreased substantially.[2] As the city's local government unit, the Surat Municipal Corporation (SMC) provides free basic water and sewage services to these settlements, and has obtained money from the Jawaharlal Nehru National Urban Renewal

[2] South Gujarat Chamber of Commerce and Industry. 2013. Interview with president. January 25: Surat, India.

Mission (JNNURM)[3] to finance the building of around 22,000 housing units to resettle slum dwellers.

Surat became one of the pilot cities for the Rockefeller Foundation's Asian Cities Climate Change Resilience Network (ACCCRN) in 2008. Surat's historical exposure to natural hazards, good local governance system, and strong support from private and expert actors proved to be good assets for initiating adaptation planning and gaining civil society support from the outset. In June 2011, after completing a series of intensive participatory and visioning exercises, the ACCCRN program published Surat's *City Resilience Strategy* (CRS). The CRS highlighted issues of flood risk, public health, and water security as critical adaptation and development priorities for the city (ACCCRN, 2011). Since 2012, climate adaptation planning has been institutionalized in the form of the Surat Climate Change Trust (SCCT), which is tasked with facilitating projects that both address projected climate impacts on the city's infrastructure and support the improvement of urban livelihoods.

5.1 Historical Roots of Socioeconomic and Climate Resilience

Surat began in the 17th century as a trading outpost and mid-point between Europe and the colonies in Southeast Asia (Haynes, 1991; Subramanian, 1985; Yagnik and Sheth, 2005). By the early 18th century, the city had one of the densest urban cores in the world (Shah, 1994). Although this density promoted cosmopolitanism and an appreciation of social diversity, it also exposed the city to extreme human and natural disasters (Dutt et al., 2006; Ghosh and

[3] Launched in December 2005, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) is a scheme aimed at empowering urban local bodies to better plan and develop cities, to facilitate urban economic development, and to improve the quality of life of urban residents. Initially implemented in 66 pilot cities, JNNURM incentivized urban reforms through linking critical infrastructure and public service development projects with conditional fiscal transfers from state and national governments (Government of India, 2013). Examples of such reforms range from mandating cities to prepare city development plans (CDP) to improving public transportation, water and sanitation infrastructures, and e-governance schemes. Phase I of JNNURM, initially lasting from 2005 to 2012, was recently extended until 2014 and has since generated a total of nearly 1.25 trillion rupees (approximately US$20 billion) in investments, of which half was allocated from the central government.

Ahmad, 1996; Lobo and Prasad, 1998). For example, the presence of people from all corners of the world meant that disease outbreaks (such as bubonic plague) were very common. Although Surat's economic centrality was gradually replaced by the importance of Bombay (Maloni, 2010; Shah, 1994), Surat maintained its artisanal textiles industry (Haynes, 1986; Menning, 1997a) and remained a commercial center for Southern Gujarat through to the 20th century (Menning, 1997b; Nadri, 2008; Torri, 1990).

Like many other localities across India, Surat's economic resurgence occurred during the period of trade liberalization in the late 20th century. The city's synthetic textile industry began to take off in the mid-1960s, which was soon followed by the diamond cutting industry in the late 1960s (Engelshoven, 1999; Haynes, 1986; Menning, 1997a). Despite increased foreign competition, Surat's system of small-scale capitalist entrepreneurs and artisanal firms relied on large informal networks based on ties of kinship, caste, sect, and place of origin (Menning, 1997b). For example, the textile industry was heavily controlled by a small number of families, many belonging to the Khatri, Modh Vanika, Rana, Patidar, Nagar Brahmin, and Hindu Bania castes (Menning, 1997a). The diamond cutting industry was introduced to Surat by Jain families in the 1960s, who, together with Saurashtrian families, still control much of the business today (Kashyap and Tiwari, 1984). These industries, rather than being overwhelmed by newer and larger industrial structures and institutions, opted to conditionally adopt technological advances. Industries welcomed changes that met their social needs, while rejecting others that did not fit into their artisanal family economy and tradition of small firms. As a result, Surat's economy today lacks centralized and hierarchical controls, and, rather, is based on a system of dynamic and social-industrial institutions like the family firm, extended kin groups, and caste and sectarian networks (Menning, 1997a).

Surat's historical rise to economic prominence highlights the crucial role held by the private sector in partnering with city government to produce growth (Kashyap and Tiwari,

1984; Menning, 1997a). This history is also intimately connected to the city's natural environment. Surat sits along the Tapi River and is particularly vulnerable to sea level rise, urban inundation due to peak river flow discharge, increasing monsoonal precipitation, and associated public health concerns (ACCCRN, 2011; Bhat et al., 2013). The historical turning point for Surat's environmental consciousness was in 1994, when the city experienced a plague epidemic. This epidemic was likely caused by general unsanitary conditions and the lack of effective solid waste treatment facilities (Dutt et al., 2006; Shah, 1997). The city leadership during the time subsequently made efforts to involve citizens for launching an urban cleaning and sanitation campaign (Shah, 1997). This led to a series of governance reforms to the city's public health services, including strengthening the health surveillance system, expediting the construction of new sewage and water infrastructure, decentralizing health-monitoring services to the district level, and promoting civil society ownership over these new programs.

The constant need to react to and cope with environmental stresses is embedded within the city's historical economic growth pattern. This has resulted in an urban socioeconomic arrangement that values the ability to effectively adapt to external economic and developmental shocks through employing local, community-based safety nets. Even today, the Southern Gujarat Chamber of Commerce and Industry (SGCCI), with its 4,000 direct members and around 67 affiliated associations accounting for around 70,000 members (Bhat et al., 2013), is immensely influential in directing city development projects. As one city leader noted, this ability to effectively adapt to economic shocks translated into a similar ability to be resilient to climate hazards,

> "We experienced floods repeatedly, damage due to floods, damage to the industry, economy, and human health… So that may be one of the reason[s] why people were [resilient]… and people fought together to do something, to

> promote, to further enhance our economic activities, and to ensure that the human lives are not affected."[4]

As one can see, coping with and adapting to the effects of hazards and the nurturing of socioeconomic resilience became an economic necessity.

For Surat's economy, examples of adaptation strategies include moving industrial equipment to the upper levels of buildings, moving bank facilities to locations above previous flood marks, compiling capital asset databases for easing audits and insurance claims after disaster events, and conducting local-level information, awareness, and education programs on the effects of vector-borne diseases.[5] These local adaptation strategies are relatively free from formal public policy, are often products of innovation and experimentation, and are developed through informal processes and institutions. As one member of the SGCCI reflected,

> "[People] ensured that all belongings, all valued things, and all property papers are stored at a higher place… Banks used to have lockers, safe deposit lockers in the basement. They started taking them and putting up on top. So everyone started working towards their own adaptation planning without knowing anything about the adaptation strategy."[6]

The dynamics between strong public-private networks, a capitalist entrepreneurial spirit, and grounded approaches to development are embedded in the overall governance fabric of the city. These dynamics have also permeated through to more contemporary planning and policy-making experiences, and shape the political economic contexts within which planning for climate change was originally conceived and implemented starting in 2008.

[4] Urban Health and Climate Resilience Centre. 2013. Interview with director. January 26: Surat, India.
[5] South Gujarat Chamber of Commerce and Industry. 2013. Interview with president. January 25: Surat, India.
[6] South Gujarat Chamber of Commerce and Industry. 2011. Interview with vice-president. January 10: Surat, India.

5.2 Urban Adaptation Planning: From Initiation to Institutionalization

In 2006, unusually high rainfall produced high discharges from the Ukai Dam, located upstream from Surat on the Tapi River. During this event, 75% of the city's built area was flooded, leading to skyrocketing incidences of gastrointestinal and vector-borne diseases (Bhat et al., 2013). As a response to disasters such as this, Surat's climate adaptation initiative is heavily focused on public health, flooding, water supply, rapid urbanization, and resilient economic development (ACCCRN, 2011). The experience of natural hazards has also prompted the local government to maintain detailed records of each disaster episode, to continuously carry out citywide data collection and recording, and to promote citizen awareness of flooding, public health, and other hazard-related vulnerabilities.

Table 1 Surat City Climate Resilience Strategy (2011) Pilot Projects

Project Name	Project Description
Surat Safe Habitat Planning and Design Competition	The competition focused on the themes of planning and designing cluster housing for low-income groups in areas prone to frequent flooding and spatial area planning of low-lying areas with high flood risk.
Urban Service Monitoring System (UrSMS)	This project is in conjunction with the requirement of adopting Urban Service Level Benchmarking (USLB) for evaluating the performance of urban infrastructure projects under JNNURM.This allowed city officials to both access real-time data and evaluate the performance of various aspects of the city's service delivery system. The main issues monitored by the system included quantity and quality of water supply, solid waste collection and treatment, clearing of drains and sewers, and other public health-related incidences.
Vulnerable Peoples Database	This was a web-based platform that included basic demographic data and GPS data of the people most in need, which was then linked with the existing ward level disaster management plan. The data was then combined with flood forecasts and risk maps to build an spatial information and projection system that would determine the exact location of residential areas under high risk and would, therefore, require special attention during emergencies.

Source: ACCCRN, 2011

Between 2009 and 2010, the ACCCRN program, in partnership with local research institutions, worked with city government to produce urban risk and vulnerability

assessments of socioeconomically important sectors, to design three adaptation pilot projects (see Table 1), and to draft a city resilience strategy. GIS-based risk assessments indicated areas of high climate risk while socioeconomic and demographic surveys showed vulnerability hotspots across the city (ACCCRN, 2011). Upon the completion of the commissioned studies, ACCCRN actors proceeded to integrate the information through a series of risk-to-resilience workshops, where participants engaged in scenario planning and identified short- and medium-term resilience building activities (see Table 2) (Reed et al., 2013).

Between 2010 and 2011, the process followed the shared learning dialogue (SLD) methodology. This was a structured iterative process with distinct phases of stakeholder engagement, assessment and sector studies, city resilience strategy, collaborative city interventions, and learning, synthesis, and documentation exercises (Kernaghan and da Silva, 2014; Reed et al., 2013). In order to further stakeholder engagement, the ACCCRN process set up a City Advisory Committee (CAC)[7] that facilitated planning for socioeconomic development as well as delineating the city's major climate challenges. The CAC held regular interdepartmental meetings, assisted in the formation of a community climate awareness group, kick-started a series of pilot projects (see Table 1), and completed five sectoral risk and vulnerability studies. One sector official described the adaptation planning process under the CAC as such,

> "To come out with the various projects, I need to have proper backup data, present data, present performance, and future data. Then I need to present before the CAC. In my sector, these are the data that suggests which should be

[7] Members of the City Advisory Committee (CAC) include: Municipal Commissioner, Surat Municipal Corporation (SMC); Deputy Commissioner, SMC; Chief Engineer, SMC; Councilor, SMC; President, South Gujarat Chamber of Commerce and Industry (SGCCI); Vice President, SGCCI; Director, Gujarat State Disaster Management Authority; Executive Engineer, Surat District Panchayat Irrigation Department; Technical Director, Urban Social Health Advocacy Alliance; Director, Sardar Vallabhbhai National Institute of Technology; Director, Centre for Social Studies.

> the planning projects that should be implemented to meet the future demand and future events. Having appraised all sectors' projects [the CAC] is going to propose one consolidated group of projects, comprised maybe one from each sector. [The CAC] is going to combine all projects into proposal for finance."[8]

In other words, adaptation options were appraised and prioritized in an expert-led and evidence-based manner. CAC members were able to frame climate impacts in terms of the city's developmental needs and work with other stakeholders and scientific experts to devise the most appropriate adaptation strategies. As another municipal corporation department official noted,

> "The Technical Scrutiny Committee [of the SMC] can review the project and can study the cross-sectoral consequences. And after all this, the CAC will give you permission for executing these projects. Definitely, if the consequences are not in favor of the citizenry, they will refuse. The Standing Committee is only given the signal once the project is totally technically viable, feasible, and has been proposed by the [Municipal] Commissioner."[9]

This shows that the city advisory committee provided accountability for planning and implementation while also serving as a platform upon which different adaptation and development needs were assessed and integrated along each step of the planning process. Notably, one SMC sector official remarked that, "the CAC has nothing to do with the individual sectors, they represent all sectors."[10]

Finally, after consultations with community groups (including those representing slum-dwellers), the government released the *Surat City Resilience Strategy* (CRS) in April

[8] Urban Social Health Advocacy Alliance. 2011. Interview with Technical Director. January 11: Surat, India.
[9] Surat Municipal Corporation. 2011. Interview with officer from Water Treatment Authority. January 12: Surat, India.
[10] Surat Municipal Corporation. 2011. Interview with officer from Water Treatment Authority. January 12: Surat, India.

2011. The CRS focused on identifying potential adaptation resilience building strategies across all the key municipal sectors (see Table 2) (ACCCRN, 2011). The main objectives of the CRS were to understand projected climate scenarios and potential impacts, to identify main areas and factors of urban vulnerability, and to assess existing capacities to adapt (Brown et al., 2012).

Table 2 Summary of short- and medium-term climate adaptation needs and options from the *Surat Climate Resilience Strategy* (2011)

Sector	Adaptation Needs	Potential Adaptation Options
Natural Disasters	Early warning system; strengthening response plans; use of information and communication technology in emergency management; decreasing response time.	Formation of a climate watch group to collect and manage data on various fast and slow changing parameters; provide support to decision makers; modeling, analysis, and sharing of real time weather information; developing multi-scalar and multi-sectoral disaster response plans; flood, surge, and tidal area zoning; appropriate building zoning rules; real time flood warning systems; improvements to disaster response plans; training and involvement of citizen groups in response action.
Urban Health	Vector-borne and water-borne diseases; heat strokes; flood related health risks to vulnerable populations.	Improving disease surveillance and epidemiological research support to track diseases; health GIS; networking and access for disease surveillance and epidemiological research; improved vector control system; information, education, and communication programs on heat related diseases.
Population	Reducing livelihood vulnerability by improving labor skills; informal education; push migration from impacts on rural areas; dominance of low skilled population.	Informal skill building courses on technologies; improved services; monitoring program on migration and demand focused skill-building
Environment	Reducing vehicle pollution impacts, improve quality of life; higher impact of pollution due to increasing temperatures.	Plan for increasing share of public transportation; create no-vehicle areas and time zones in over-crowded core; decongesting road system; parking fee rationalization; build pedestrian friendly roads.
Economy	Reducing economic losses; reduce labor day lost due to higher temperatures and diseases.	Minimize losses by preventive measures (asset banks, vehicle and parks outside flood zones); emergency business continuity management plans for natural disasters; health support system for industrial workers; managed retreat of industries to low risk zones.
Social Equity	Housing for the poor, build, strengthen, and empower citizens groups, build federations of local level agencies; social cohesion issues.	Affordable, thermally comfortable, flood resistant houses for poor; awareness generation; forming issue-based groups for community action on managing local assets; managing Surat's social image through local groups and positive action; preventative action on conflicts.
Technology	Energy audits, awareness about energy savings, demonstration; promote Surat to become a center for climate technologies.	Support agency for energy efficiency improvement; expansion focused on clean and upcoming industrial/service sectors.

Source: ACCCRN, 2011

In 2012, the city advisory committee decided to institutionalize the adaptation planning process in order to sustain the momentum and legacy it had initiated. The CAC believed that adaptation planning was critical to the continued economic development of the city, was an important mechanism for preparing the burgeoning urban population against projected climate impacts, and would serve to raise the profile of Surat in the international arena. As a result, the Surat Climate Change Trust (SCCT) was formed in June 2012, with the 14 original committee members staying on to become trustees.[11] Instead of being an informal gathering of experts, the SCCT would now be able to formalize the roles of these different trustees. One SCCT member noted that,

> "ACCCRN was working as a very informal body; there was nothing formal. So we decided to institutionalize the ACCCRN program. [The] South Gujarat Chamber of Commerce and Industry and the Surat Municipal Corporation are the pioneering institutions in Surat who were driving the ACCCRN program. So we got hold of various other institutions who can come together and stay in one group. We decided to form a trust, an entity that can then take up this work. At the end of ACCCRN, what we wanted was something that keeps us going further. That was possible only if we had some kind of organizational mechanism in place."[12]

In essence, the SCCT is a nonprofit entity working side-by-side and receiving indirect support from the Surat Municipal Corporation (SMC). The idea is that the SCCT would be able to bypass some of the bureaucratic constraints related to fundraising and institutional

[11] The Surat Climate Change Trust (SCCT) was formed in June 2012 under the auspices of the *Bombay Public Trust Act* of 1950. The legislation applies in both Maharashtra and Gujarat because they were unified under the Bombay State when it was passed. The Bombay State was dissolved in 1960 into Gujarat and Maharashtra. The *Bombay Public Trusts Act* was subsequently retained with more or less the same provisions and currently continues to govern the establishment and operations of charitable entities in both states.

[12] South Gujarat Chamber of Commerce and Industry. 2013. Interview with president. January 25: Surat, India.

autonomy that come with situating this new program within the SMC itself. In June 2013, using remaining seed money supplied by the ACCCRN program, the SCCT embarked on a series of three large projects (see Table 3), which subsequently catalyzed a significant change in SMC's action priorities—In early 2013, the SMC adopted the issue of climate change as one of the line items included in their annual municipal budget. This line item earmarked 20 million rupees (approximately US$300,000) per year for climate adaptation and resilience building purposes.

Table 3 Surat Climate Change Trust (SCCT) initial projects

Name of Project	Cost (US$)	Duration	Project Partners	Project Description
End-to-End Early Warning System	$509,900	December 2010 - March 2013	SMC Narmada Water, SMC Resources and Water Supply Department, Gujarat State Disaster Management Authority, Surat Urban Development Authroity, Central Water Commission, South Gujarat Chamber of Commerce and Industry	This system will allow for the integration of existing hydrological, climate, and urban development models into one comprehensive database. The system would include a near real-time early warning communication system and a database of vulnerable peoples. This system is expected to benefit households by allowing longer evacuation times and, thus, prevent overly costly disruption to livelihoods and businesses.
Urban Health and Climate Resilience Center	$521,795	August 2012 - December 2015	SMC Health Department, Surat Municipal Institute of Medical Education and Research	This Center will build on the knowledge and operating procedures of the city's existing public health facilities. This center was directed to install an improved vector-borne disease surveillance system, steer an inter-disciplinary research team to advise the city's actions towards managing the existing public health system in light of climate change, and start a community-wide outreach program that promotes preventative health practices.
Cool Roof and Passive Ventilation Program	$556,120	August 2012 - January 2015	TARU Leading Edge, private real estate developers, manufactureres, SMC, SUDA, Association of Architects and Builders	This program promotes low cost, low energy options for controlling indoor temperatures. This will help to alleviate public health impacts from extreme heat.

Source: ACCCRN, 2013

Just like Surat's developmental history, the case of how adaptation was initially conceived and how adaptation was eventually institutionalized shows a level of

embeddedness between the urban political and private capitalist and entrepreneurial classes. This embeddedness was critical for generating project information and ideas, co-creating implementation strategies, and ensuring overall resource and capacity support. Between these government and private actors, adaptation and development strategies were simultaneously designed with projected climate impacts and impending economic development needs in mind, where adapting to increasing episodes of flooding, vector-borne diseases, and other hazards were framed as critical to the city's continued economic development and the social welfare of its citizens.

5.3 Assessing Surat's Experience

A critical analysis of climate adaptation planning in Surat points to the value of a political economic approach to examining how externally driven planning interventions are eventually implemented in an urban context with competing local development priorities, existing governance and political arrangements, and associating socioeconomic power differentials. The Surat case contributes to theory and practice in two specific ways.

First, through unpacking Surat's development history, the paper highlights the way in which climate adaptation is planned and implemented depends heavily on preexisting, contextually-specific urban political relationships whose bases can be traced back through time. Industrial development in Surat is driven by close-knit entrepreneurial communities that have a history of fostering small-scale innovation and creative solutions. Through embedded arrangements between the public and private actors, adaptation planning in Surat harnessed and integrated the experimental nature and innovative power of local practices into existing urban development processes. Furthermore, these embedded relationships drove the general public's understanding that socioeconomic and environmental resilience were closely linked and, as a result, is one key reason for the city's historical resilience against external economic

and environmental shocks. Conversely, this observation also speaks to the difficulty of imposing external processes that are inflexible and are not conducive to local politics, social relationships, and ways of doing things. My aim here is not to conclude that Surat's experience of planning for adaptation operates under a historically pre-determined pathway, but for planners and policymakers to be cognizant of local political economic contexts when pursuing adaptation at the city level. Understanding the local histories within which adaptation exists will ultimately improve the effectiveness of strategies, increase legitimacy, and help to sustain programs and projects in the long run.

Second, the Surat case shows the various tradeoffs involved in both adaptation planning processes and implementation outcomes when private actors are embedded in local political decision-making. The objective here is not to pursue a neoliberal or elitist critique of the existing adaptation planning approach in Surat, but to empirically show the merits and limits and the conflicting outcomes associated with such an adaptation governance arrangement. In Surat, even though the ACCCRN program introduced a rigid planning formula, local government and private actors worked with this external process and modified it to highlight existing local political conditions, a populace that was aware of existing climate risks, and a culture that valued private actor participation and innovation. For instance, under the city advisory committee, adaptation needs and options were iteratively appraised between different urban actors and institutions, which ensured that the multi-stakeholder planning process adequately incorporated cross-sectoral expertise and acknowledged diverse views. This, then, allowed for the appraisal of projects that integrated adaptation needs into day-to-day urban development agendas. Similarly, the Surat Climate Change Trust also serves as a platform for vetting and prioritizing adaptation and development needs through discursive processes that result in the co-creation of implementation options.

Despite these early advances in initializing and institutionalizing adaptation planning, a critical examination of adaptation outcomes yields more conflicting results. In particular, one very important limit at this early stage is the tradeoff between the autonomy of the Surat Climate Change Trust and the ability to directly access decision makers and relevant technical information from within the Surat Municipal Corporation. The Surat Climate Change Trust often experiences difficulty approaching and coordinating with different municipal corporation departments and units, thereby resulting in the inability to effectively co-create synergistic projects and programs that both tackle underlying urban adaptation and development needs *and* efficiently assemble and utilize funds from different public and private sources.

A second limit is in terms of justice and equity concerns for the urban poor, where traditional communal divisions between religions and castes have seemingly not been overcome in this adaptation and development planning approach. On the one hand, the ability to harness support from private actors and networks facilitated the building of institutional momentum around adaptation planning and consolidate, legitimize, and mobilize support in this nascent policy domain. Because of this, even a local government with limited financial capacity, like in the case of Surat, can adjust their planning and regulatory framework to adaptation by soliciting support from different civil society actors. On the other hand, the degree to which private actors are embedded in local government yields heightened power and authority inequalities between the private capitalists, who have historically already played a key role in urban development, and the poor and vulnerable, who are projected the bear disproportionate climate impacts. For example, one criticisms of the ACCCRN process was the its limited public exposure and awareness—the majority of the planning and policymaking since 2008 was done by a select few involved in the Surat Municipal Corporation (SMC), the South Gujarat Chamber of Commerce and Industry (SGCCI), and

other key experts and stakeholders in the city. Regular citizens were rarely consistently informed or included.

6 Urban Political Economy and Climate Change Adaptation

Despite conflicting outcomes, the Surat case highlights how adaptation is operationalized in a developing country urban context and shows how local political economic factors shape the institutional form of decision-making around integrating adaptation with development priorities. The paper assessed the evolution of adaptation planning in Surat between 2008 and 2013, and showed how the trajectory of adaptation planning and implementation was dictated by embedded relationships between local government politics and local private actor influences. This embeddedness produced an adaptation planning process that not only took into account the content of programs and projects, but also eventually produced a development planning approach that was transformed in the context of these emerging climate adaptation needs. The benefits of this approach, though, still do not mask the reality that many poor and disadvantaged communities continue to be marginalized and excluded from participating in the planning process.

In conclusion, this paper points to a recent phenomenon of city governments harnessing local strategies to inform how climate adaptation is governed and integrated with development on the ground. Climate adaptation requires complex, cross-sectoral action and coordination. Surat's response to this challenge is to utilize existing network of private actors to devolve responsibilities for creating and appropriating local adaptation and development strategies. A political economic approach to theorizing climate adaptation, therefore, is a tool for scholars to assess how city governments think about adaptation vis-à-vis other urban development priorities, how embedded social and political relationships are directing decision-making in this emerging policy domain, and how experiences around social justice

and equity outcomes can further direct and shed light on what cities can pursue in order to affect further transformative change.

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